

Appl. No. 10/822583

In the Claims:

Listing of all claims:

1-47 (Cancelled.)

1 48. (Currently Amended) An apparatus for welding
2 by depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 a power source having a first waveform during
6 a short condition and a second waveform during an arc
7 condition as an output, wherein the output is in
8 electrical communication with the welding wire;
9 a feedback circuit, for providing a signal
10 indicative of the output being in the short or the arc
11 condition;
12 a controller, coupled to the feedback
13 circuit, and having a control output provided to the
14 power source, wherein the control output commands the
15 first waveform to have be a desired and controlled
16 current waveform and the second waveform to be have a
17 desired and controlled voltage waveform.

1 49. (Previously Presented) The apparatus of
2 claim 48, wherein the feedback circuit includes a
3 comparator.

1 50. (Previously Presented) The apparatus of
2 claim 49, wherein the comparator receives a threshold
3 voltage and a signal responsive to output voltage as inputs.

1 51. (Previously Presented) The apparatus of
2 claim 48, wherein the feedback circuit includes as an output

Appl. No. 10/822583

3 a real-time signal indicative of the heat input to each
4 drop.

1 52. (Previously Presented) The apparatus of
2 claim 51, wherein the controller controls the first and
3 second waveforms to provide a desired mass deposition rate
4 responsive to a wire feed speed and a distance from a tip of
5 the wire to the workpiece.

1 53. (Previously Presented) The apparatus of
2 claim 52, wherein the feedback circuit has an output current
3 feedback signal and an output voltage feedback signal
4 provided to the controller, and wherein the controller
5 controls the first waveform in response to the output
6 current feedback signal and the second waveform in response
7 to the arc voltage feedback signal.

1 54. (Previously Presented) The apparatus of
2 claim 48, wherein the feedback circuit has an output current
3 feedback signal and an output voltage feedback signal
4 provided to the controller, and wherein the controller
5 controls the first waveform in response to the output
6 current feedback signal and the second waveform in response
7 to the arc voltage feedback signal.

1 55. (Currently Amended) An apparatus for welding
2 by depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 power means for providing power in the form
6 of a first waveform during a short condition and a
7 second waveform during an arc condition to the welding
8 wire;

Appl. No. 10/822583

9 feedback means for providing a signal
10 indicative of the output being in the short or the arc
11 condition;
12 control means for controlling the power means
13 in response to the feedback means, wherein the power
14 means is controlled such that the first waveform has is
15 a desired and controlled current waveform and the
16 second waveform has is a desired and controlled voltage
17 waveform.

1 56. (Previously Presented) The apparatus of
2 claim 55, wherein the feedback means includes a means for
3 comparing two signals.

1 57. (Previously Presented) The apparatus of
2 claim 56, wherein the comparator means receives a threshold
3 voltage and a signal responsive to output voltage as inputs.

1 58. (Previously Presented) The apparatus of
2 claim 56, wherein the feedback means includes means for
3 providing a real-time signal indicative of the heat input to
4 each drop.

1 59. (Previously Presented) The apparatus of
2 claim 57, wherein control means includes means for
3 controlling the first and second waveforms to provide a
4 desired mass deposition rate responsive to a wire feed speed
5 and a distance from a tip of the wire to the workpiece.

1 60. (Previously Presented) The apparatus of
2 claim 55, wherein the feedback means provides an output
3 current feedback signal and an output voltage feedback
4 signal provided to the control means, and wherein the

Appl. No. 10/822583

5 control means includes means for controlling the first
6 waveform in response to the output current feedback signal
7 and the second waveform in response to the arc voltage
8 feedback signal.

1 61. (Currently Amended) A method of short circuit
2 welding, comprising:
3 providing power in the form of a first
4 waveform during a short condition and a second waveform
5 during an arc condition to a welding wire;
6 providing a feedback signal indicative of the
7 output being in the short or the arc condition;
8 controlling the power in response to the
9 feedback such that the first waveform has is a desired
10 and controlled current waveform and the second waveform
11 has is a desired and controlled voltage waveform.

1 62. (Previously Presented) The method of claim
2 61, further comprises comparing two signals.

1 63. (Previously Presented) The method of claim
2 62, wherein comparing includes comparing a threshold voltage
3 and a signal responsive to output voltage.

1 64. (Currently Amended) The method of claim 61,
2 wherein the short circuit welding includes depositing a
3 plurality of successive drops, and further comprising
4 providing a real-time signal indicative of the heat input to
5 each of the plurality of successive drops drop.

1 65. (Currently Amended) The method of claim 61
2 60, further comprising controlling the first and second
3 waveforms to provide a desired mass deposition rate

Appl. No. 10/822583

4 responsive to a wire feed speed and a distance from a tip of
5 the wire to the workpiece.

1 66. (Previously Presented) The method of claim
2 63, further comprising providing an output current feedback
3 signal and an output voltage feedback signal to the control
4 means, and controlling the first waveform in response to the
5 output current feedback signal and the second waveform in
6 response to the arc voltage feedback signal.

1 67. (Previously Presented) The method of claim
2 63, further comprising providing an output current feedback
3 signal and an output voltage feedback signal to the control
4 means, and controlling the first waveform in response to the
5 output current feedback signal and the second waveform in
6 response to the arc voltage feedback signal.